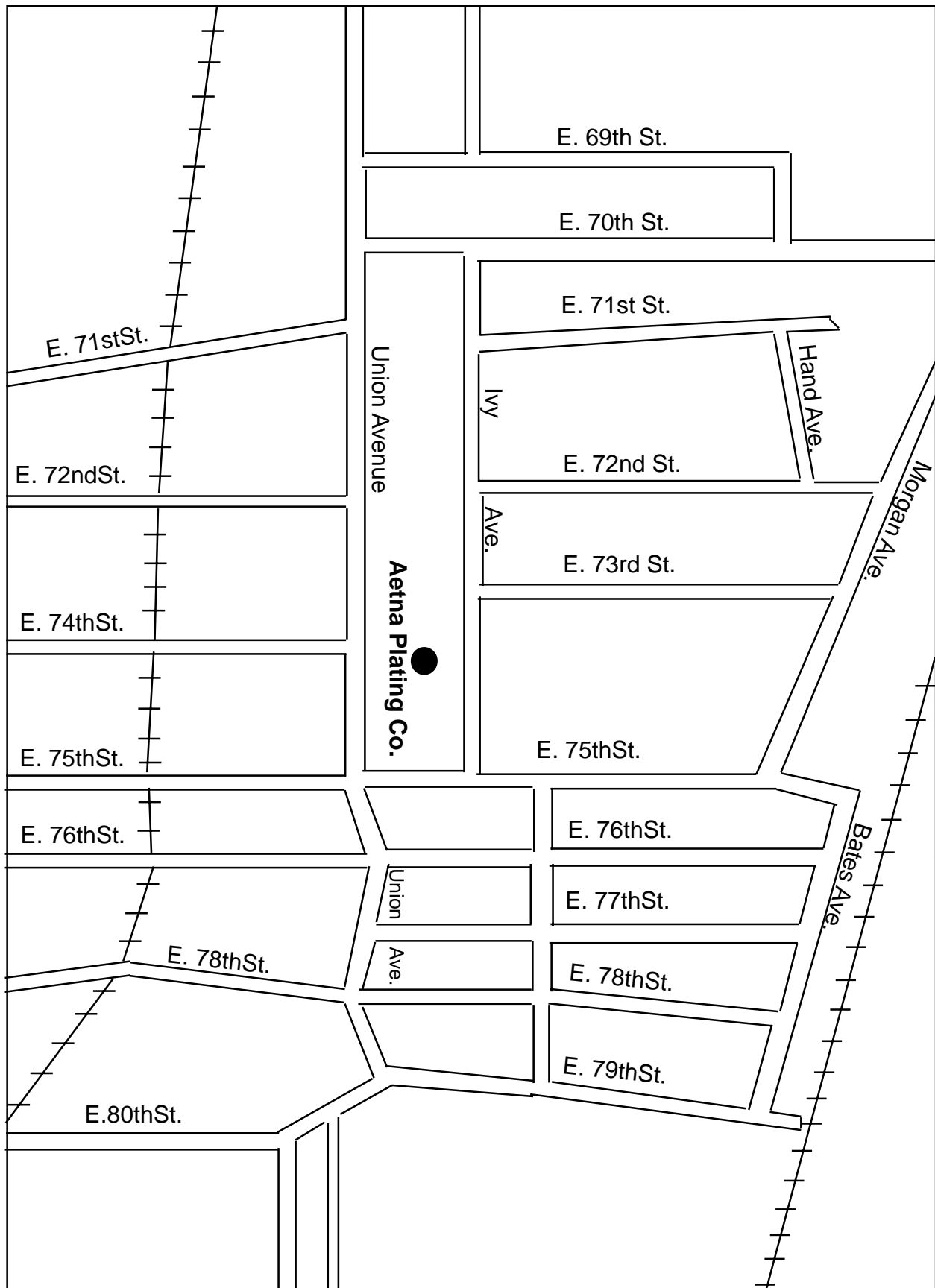


CASE STUDIES



Case Study Cleveland, Ohio

Around 10:00 a.m. on Saturday, March 29, 1997, a three-alarm fire broke out at the Aetna Plating Company in Cleveland, Ohio. The company employed about 40 workers, none of whom were in the building at the time of the fire. A neighbor who spotted smoke coming from the building reported the fire.

Responding fire fighters found heavy smoke coming from the building. The building did not have a sprinkler system. Fire fighters began ventilating and attacking the fire from the interior. They discovered the source of the fire in the northwest corner of the basement. Three engine companies supplied five master streams and several hand lines. Command staged at E. 79th and Union Ave; apparatus was staged at E. 75th and Union Ave.

Aetna, a metal plating company that produces coatings for heavy machinery, uses a number of toxic materials in its production process. Trichloroethylene, sodium hydroxide, sulfuric acid, hydrogen fluoride, various cyanides, and other caustic and toxic materials were reported to be in the building.

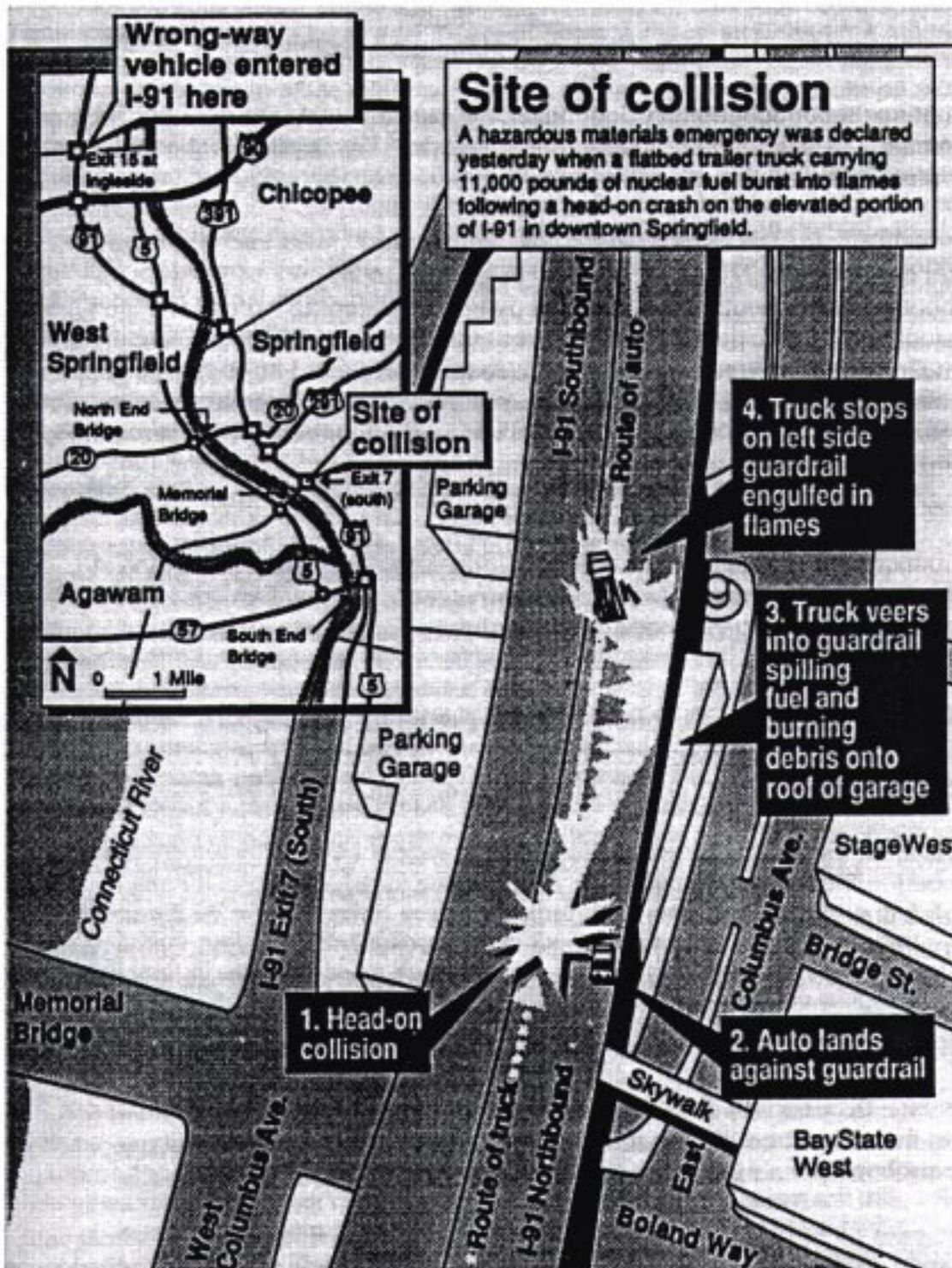
Before the fire could be extinguished, conditions worsened. Fire fighters were ordered from the building and assumed a defensive position. About 20 residents in homes on Union Avenue and E. 73rd St. were evacuated as a precaution.

Runoff water was diked on the north and south sides of the building. Water on the north side was pH tested and found to be neutral; however, water on the south side was highly caustic, with a pH of 14. Runoff water also contained higher levels of cyanide than were expected, and was greenish in color. Green may indicate the presence of heavy metals.

Fire fighters soon began complaining of ill effects from smoke exposure about two hours after they arrived at the scene. A triage area was set up by the Heavy Rescue team, upwind of the fire. Most complaints concerned burning sensations in the throat and lungs, headache and nausea. Information gathered at the scene from the owner and his hazardous materials person indicated that most chemicals present were unlikely to enter the atmosphere. However, there was a 250-gallon tank of trichloroethylene present. This is a volatile chemical that evaporates readily when exposed to heat.

A total of 32 fire fighters went to various hospitals with respiratory symptoms or headaches. Five were kept overnight; the others returned to duty. The incident was terminated about 12 hours later. During that time, fire fighters had returned to the scene periodically to deal with hot spots. The Aetna building was completely destroyed. A new vehicle just purchased by the company was also totaled. Since the fire, Cleveland Fire Department haz mat specialists have worked with the owner and the Ohio EPA to clean up the site. The cost of the cleanup is expected to surpass \$500,000. The cause of the fire remains undetermined.

After an inspection, the Cleveland Fire Department issued a report stating that "...runoff is most likely a 50% sodium hydroxide solution contained in a 3,000 gallon tank near the Union Avenue side of the building. At this time, we do not believe the cyanides were affected by runoff or the fire. The green color was probably a chromium precipitate in a sludge pit that the fire streams were disturbing. NE Ohio Regional Sewer determined the only affected runoff was in the immediate Union Avenue area and not onto other properties or other storm drains. The effects felt by Fire Department members was potentially a trichloroethylene open vat in the immediate area of the fire origin. This could contribute to the respiratory distress and other effects being felt by Cleveland Fire Department members."



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Case Study

Springfield, Massachusetts

Emergency response teams in Springfield, Massachusetts had their hands full on December 16, 1991, when a drunk driver slammed into a tractor trailer carrying 11,000 pounds of nuclear fuel.

Around 3:00 a.m. a drunk driver started for his home in Connecticut from a bar in Holyoke, Massachusetts. He headed south on Interstate 91...in the northbound lane. About the same time a couple was in their flatbed trailer loaded with nuclear fuel. They were en route from a General Electric plant in North Carolina to the Vermont Yankee nuclear power plant in Vernon, Vermont. Their cargo was 24 solid fuel rods in 12 zirconium casks in wooden crates, with an estimated value of one million dollars. The fuel rods were unirradiated uranium dioxide. Unirradiated nuclear fuel is less dangerous than irradiated, or "spent" fuel, but it does emit alpha radiation. This material was not required to be placarded.

The couple in the flatbed tractor-trailer had just stopped to refill two 125-gallon diesel tanks just south of Springfield. As they drove into the downtown area, they saw the drunk driver's car coming the wrong way in their lane, headed straight for them. The tractor-trailer swerved but the other vehicle hit the passenger side.

Both vehicles hit the east guardrail. The car stopped, but the truck veered across the lanes and landed on the southbound lanes. There were only minor injuries. The tractor-trailer, however, was engulfed in flames.

Massachusetts state police responded to the accident on I-91 a few minutes after it happened. Fortunately, the truck driver had been able to retrieve the shipping papers from his burning tractor-trailer cab before it was engulfed in fire. According to these papers, the cargo was 4,864 kilograms of "u-enriched <20%, solid, uranium dioxide," classified as "RQ Radioactive Material, Fissile N.O.S. (not otherwise specified)." The UN code was UN 2918. There were 12 wooden cases on the truck. Each case held steel containers. The containers carried a total of 11,000 pounds of uranium dioxide.

Ambulances transported the couple and the other driver to the hospital. At the hospital, a medical doctor with a radiation survey instrument checked the ambulances, the EMTs, their equipment, and the three patients. No signs of contamination were found.

One of the ambulances transporting the victims notified Engine No. 7, which was enroute to the scene, of the radioactive cargo on the burning truck. The lieutenant on No. 7 was also the hazardous materials team leader. He staged the engine at a safe distance to observe the fire. Meanwhile, the rest of the HMRT and a battalion chief were dispatched. All the arriving units staged at a safe distance and observed the fire through binoculars. From their vantage point, it looked like only the front section of the trailer was on fire, and that two large cases had fallen off the trailer. HMRT and the battalion chief agreed that it was safer to let the cargo burn until they could find out more information about the contents. The diagram on the preceding page shows the position of the vehicles after the accident.

However, the Haz Mat team was able to find out very little about uranium dioxide, except that it was radioactive and the area should be evacuated. So while the material was being researched, police evacuated the area and shut down sections of I-91 north and southbound, as well as all three bridges leading into Springfield. A survey with a Geiger counter did not show any radiation.

A command post was set up in a nearby hotel. The battalion chief called Vermont Yankee, where the nuclear fuel was being shipped; General Electric, the shipper; and the Nuclear Regulatory Commission. He was told by all three sources to isolate the area, let the fire burn, and stay away from the vehicle. Vermont Yankee also dispatched their own hazardous materials team. Later the chief received a return call from the NRC, saying that uranium dioxide was a very low-level radioactive material, the containers were crash-proof, and fire fighters could approach the vehicle and extinguish the fire. But at that point the fire was nearly out and only the tires were burning. Applying water would have compounded the problem of a diesel fuel spill, so the battalion chief decided to let the tires burn.

At the command post, representatives from the responding agencies (see below) listed their priorities and who was going to handle what. They secured a contractor and prestaged the equipment needed for cleaning up the diesel fuel so the bridges could open as soon as possible. But the fuel rods were another problem. Neither General Electric nor Vermont Yankee wanted the shipment and each claimed the other owned it. Also, the fuel rods would have to be repackaged before they could be taken to Vermont. Fortunately a local military facility, Westover Air Force Base, had facilities for repackaging the fuel rods. The Air Force Base was contacted and agreed to take the shipment.

By 9:00 a.m. the isolation area was reduced to 100 yards. A contractor had been called to clean up the diesel spill, and Vermont Yankee had agreed to transport the fuel rods to Westover for repackaging.

By the time the incident was over, the following agencies had become involved:

From the city	From the state	From the U.S. gov't	Other responders
Fire Police Public works Emergency Preparedness Parking Authority Mayor's Office EMTs Health Personnel Law	State Police Nuclear Incident Advisory Team Public Works Environmental Protection Emergency Management	NRC EPA FEMA OSHA Westover AFB DOT	Yankee Atomic General Electric Baystate Medical Center American Red Cross

Among all the activity at the accident scene were the media. Local and national news media responded in force. (One local television affiliate had a banner behind its news desk claiming "Nuclear Winter Averted.")

The nuclear fuel was transported to a local military facility, Westover Air Force Base. The public was never told of its destination.

Springfield, Massachusetts has had an integrated Hazardous Materials Incident Response Plan since 1986. Among other items, the plan has procedures for:

- Notifying the proper authorities
- First responder operations
- Other fire department operations
- Obtaining assistance from police, civil defense, public works and health department
- Follow-up and retraining

The plan was comprehensive for a reason. Interstate 91 is the primary route between New England and New York. In the city, where the incident took place, I-91 runs parallel to a railroad and a river, crosses other railroad tracks, and connects with I-291. There are any number of opportunities for transportation incidents.

End note: When the fire cooled, the NRC investigated the burned truck. The fire had consumed the wood containers and damaged the metal casks inside. In the most severely damaged containers, the fuel assemblies had been distorted to conform to the metal cask. The plastic fuel rod separators and foam protection for the fuel assemblies also burned, and some of the clad tubes had swollen from the pressures caused by high temperature. Later, tests showed that temperatures would have to reach 1,500° F to cause that much damage.

